

DEREE COLLEGE SYLLABUS FOR: CH 3330 ORGANIC AND BIOLOGICAL CHEMISTRY LAB

UK LEVEL:5
UK CREDITS:10
US CREDITS:0/3/2

(Fall 2019)

PREREQUISITES:

CH 1002 Principles of Chemistry
 CH 2115 General Chemistry
 CH 3220 Organic Chemistry (co-requisite)

CATALOG DESCRIPTION:

An introduction to methods of analysis in organic and biological chemistry, with emphasis on laboratory techniques and structure determination. Students get exposed to techniques such as distillation, vacuum filtration, liquid extraction, spectroscopy, chromatography and rotary evaporation; they also learn to apply the scientific method and design an experiment.

RATIONALE:

The Organic Chemistry Laboratory is an introduction to experimental organic chemistry, with emphasis on laboratory techniques and structure determination. Students acquire fundamental organic lab techniques in the context of principles learned in the theoretical Organic Chemistry courses. Essential techniques include: Reflux, distillations, vacuum filtration, liquid extraction, spectroscopy (UV-visible, IR, NMR), chromatography (TLC, CC, paper), rotary evaporation and liquid-liquid extraction. The course concludes with a group project where students are required to design their own experiments to solve a problem. The course augments and requires as a co-requisite one of the CH 32XX Organic Chemistry and CH 33XX Organic and Biological Chemistry modules. It is essential for all students majoring in the life sciences.

LEARNING OUTCOMES:

As a result of taking this course, the student should be able to:

1. Demonstrate an understanding of essential organic chemical methods, techniques and communication taking into account green chemistry concepts.
2. Formulate and construct a methodology towards realizing a group project and apply that in an investigation.
3. Develop the necessary analytical skills to understand the nature of scientific inquiry by practicing inquiry in the laboratory and by addressing the right questions and applying the appropriate methodology.

METHOD OF TEACHING AND LEARNING:

In congruence with the teaching and learning strategy of the college, the following tools are used:

- Laboratory work (practical engagement, reporting calculations and data processing).
- Instruction and demonstration of techniques through online, virtual and physical resources.

ASSESSMENT:

Summative:

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| Laboratory Portfolio (Worksheets, short answers, investigations) | 60 |
| Group project (design and execution of a group project that addresses a particular theme in organic chemistry methodology and submission of a research paper) | 40 |

Formative:

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| Multiple homework quizzes and worksheets | 0 |
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The laboratory portfolio tests learning outcomes 1 and 3
 The group project tests learning outcomes 1, 2 and 3.

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| <p>INDICATIVE READING:</p> | <p>REQUIRED READING: N/A</p> <p>RECOMMENDED READING: Experimental Organic Chemistry, 1st Edition Authors: Joaquín Isac-García José A. Dobado Francisco G. Calvo-Flores Henar Martínez-García eBook ISBN: 9780128039359 Paperback ISBN: 9780128038932 Imprint: Academic Press Published Date: 20th October 2015</p> |
| <p>INDICATIVE MATERIAL: <i>(e.g. audiovisual, digital material, etc.)</i></p> | <p>REQUIRED MATERIAL:</p> <ul style="list-style-type: none"> • Laboratory Notebook (22.5x 28.6 cm) 100 page, Scientific Format Grid. • Laboratory Coat • Scientific Calculator <p>RECOMMENDED MATERIAL:N/A</p> <ul style="list-style-type: none"> • Organic Chemistry Model set |
| <p>COMMUNICATION REQUIREMENTS:</p> | <p>N/A</p> |
| <p>SOFTWARE REQUIREMENTS:</p> | <p>Microsoft Word, Microsoft PowerPoint, Blackboard CMS</p> |
| <p>WWW RESOURCES:</p> | |
| <p>INDICATIVE CONTENT:</p> | <p>Separation Techniques</p> <ul style="list-style-type: none"> ○ Gravity Filtration, Rotary Evaporation, Reflux: Essential Oil extraction ○ Thin Layer and Column Chromatography: Pigment separation <p>Synthetic Techniques</p> <ul style="list-style-type: none"> ○ Green Chemistry, Halogen Addition ○ Aromatic Electrophilic Substitution of Esters ○ Cleizen-Schmit Reaction ○ Esterification ○ Multi-step Synthesis of Paracetamol ○ Diels Alder Reactions <p>Isolation of Natural Products</p> <ul style="list-style-type: none"> ○ Isolation of Pigments form Plants <p>Biochemical Applications</p> <ul style="list-style-type: none"> ○ Enzyme Activity and Michaelis Menden Kinetics ○ Beer's Law: Protein Concentration Determination ○ Carbohydrate derivatives, diisopropylidene ○ Enzyme-Linked Immunosorbent Assay (ELISA) ○ Antibody electrophoresis |